

CLAIMS

We Claim:

1. A tape dispenser for supporting a roll of tape having a liner, separating the tape from the liner and applying the tape to a glass surface, comprising:

- a) a frame;
- b) a tape spool rotatably mounted to said frame;
- c) a drive roller rotatably mounted to said frame for controlling a length of such tape unwound from said tape spool;
- c) a platen having an angular front end portion that causes such liner to separate from such tape; and
- d) a rewind spool rotatably mounted to said frame, said tape spool, drive roller, platen and rewind spool defining a path of travel from said tape spool, around said drive roller, around said front end portion of said platen, to said rewind spool.

2. The tape dispenser of claim 1 further comprising a slip clutch tensioner interposed between said tape spool and said frame.

3. The tape dispenser of claim 1 further comprising a sensor coupled to said drive roller that measures a length of such tape that travels past said drive roller.

4. The tape dispenser of claim 1 further comprising a sensor coupled to said drive roller that measures torque applied to said drive roller.

5. The tape dispenser of claim 1 further comprising a die connected to said frame, said die being located along said path of travel between said tape spool and said platen and being configured to score such tape.

6. The tape dispenser of claim 1 further comprising a pressure roller rotatably mounted to said frame, said pressure roller being configured to apply pressure to such tape as such tape is applied to such glass.

7. The tape dispenser of claim 6 wherein said pressure roller is mounted to said frame by a pneumatic actuator for moving the pressure roller.

8. The tape dispenser of claim 6 further comprising a position sensor coupled to such pressure roller for determining a distance between said dispenser and such glass.

9. The tape dispenser of claim 1 further comprising a gantry that supports and moves said frame, an optical sensor coupled to said frame for detecting edges of such glass and a controller coupled to said gantry and said sensor.

10. The tape dispenser of claim 1 further comprising a motor coupled to said rewind spool.

11. The tape dispenser of claim 10 wherein said motor is coupled to the rewind spool by a slip clutch tensioner.

12. The tape dispenser of claim 1 wherein said tape spool, platen and rewind spool are mounted to a removable cartridge that attaches to said frame.

13. A tape dispenser for supporting a roll of tape having a liner, separating the tape from the liner and applying the tape to a glass surface, comprising:

- a) a frame;
- b) a tape spool rotatably mounted to said frame by a slip clutch tensioner;
- c) a drive roller rotatably mounted to said frame by a servo motor that includes a first sensor that measures a length of such tape that travels past said drive roller;

d) a platen having an angular front end portion that causes such tape to separate from such liner;

e) a rewind spool rotatably mounted to said frame by a motor and a slip clutch tensioner, said tape spool, drive roller, platen and rewind spool defining a path of travel from said tape spool, around said drive roller, around said front end portion of said platen, to said rewind spool;

f) a die connected to said frame, said die being located along said path of travel and being configured to score such tape; and,

g) a pressure roller rotatably mounted to said frame by a pneumatic actuator, said pressure roller being configured to apply pressure to such tape as such tape is applied to such glass.

14. The tape dispenser of claim 13 further comprising a position sensor coupled to such pressure roller for determining a distance between said dispenser and such glass.

15. The tape dispenser of claim 13 further comprising an optical sensor coupled to said frame for detecting edges of such glass.

16. A method of separating a tape from a liner and applying the tape to a glass surface, comprising:

a) defining a path of travel from a tape spool, around a drive roller, around a platen, to a rewind spool;

b) driving said tape and said liner with said drive roller to move said tape and said liner along said travel path to said platen;

c) moving said liner around an angular front end portion of said platen to separate said liner from said tape; and

d) applying said tape to said glass by applying pressure to said tape.

17. The method of claim 16 further comprising winding said liner onto said

rewind spool.

18. The method of claim 16 further comprising tensioning said tape and said liner between said tape spool and said drive roller.

19. The method of claim 16 further comprising measuring a length of said tape that travels past said drive roller.

20. The method of claim 16 further comprising scoring said tape and removing a portion of said tape before said tape is applied to said glass.

21. The method of claim 16 further comprising sensing a distance between said platen and said glass and moving said platen in response to said sensed distance.

22. The method of claim 16 further comprising detecting edges of said glass with an optical sensor coupled to orient said tape with respect to said edges.

23. A tape application system for separating a tape from a liner and applying the tape to a surface of a glass plate, comprising:

- a) a table for supporting such glass plate;
- b) a gantry mounted to said table such that said gantry is movable in a first direction along substantially parallel sides of said table;
- c) a dispenser actuator mounted to said gantry such that said dispenser actuator is movable in a second direction along said gantry;
- d) a tape dispenser mounted to said dispenser actuator such that movement of a linkage of said dispenser actuator causes said dispenser to move in a third direction and such that said frame is rotatable with respect to said gantry;
- e) an optical sensor mounted to said tape dispenser for detecting points along

edges of such glass plate to determine a position and orientation of such glass plate; and,

f) a controller coupled to said gantry, said dispenser actuator and said optical sensor for positioning and orientating said tape dispenser with respect to such glass plate.

24. The tape application system of claim 23 wherein said tape spool, platen and rewind spool are mounted to a removable cartridge of said frame.

25. The tape application system of claim 23 further comprising a slip clutch tensioner interposed between said tape spool and said frame.

26. The tape application system of claim 23 further comprising a sensor coupled to said drive roller that measures a length of such tape that travels past said drive roller.

27. The tape application system of claim 23 further comprising a sensor coupled to said drive roller that measures torque applied to said drive roller.

28. The tape application system of claim 23 further comprising a die connected to said frame, said die being located along said path of travel and being configured to score such tape.

29. The tape application system of claim 23 further comprising a pressure roller rotatably mounted to said frame, said pressure roller being configured to apply pressure to such tape as such tape is applied to such glass.

30. The tape application system of claim 23 wherein said pressure roller is mounted to said frame by a pneumatic actuator.

31. The tape application system of claim 30 further comprising a position sensor coupled to said pressure roller for determining a distance between said dispenser and such

glass.

32. The tape application system of claim 30 further comprising a position sensor coupled to said pressure roller and said dispenser actuator configured to determine a distance between said dispenser frame and such glass based on a sensed location of the pressure roller and to cause said dispenser actuator to move said dispenser frame with respect to said glass in response to said sensed location.

33. The tape application system of claim 23 further comprising a sensor coupled to said frame for detecting edges of such glass.

34. The tape application system of claim 23 further comprising a motor coupled to said rewind spool.

35. The tape application system of claim 34 wherein said motor is coupled to rewind spool by a slip clutch tensioner.

36. A method of separating a tape from a liner and applying the tape to a glass surface, comprising:

- a) supporting a glass article;
- b) detecting the location of said glass article by locating edges of said glass article;
- c) defining a path of travel from a tape spool, around a drive roller, around a platen, to a rewind spool;
- d) driving said tape and said liner with said drive roller to unwind said tape and said liner from said tape spool and to move said tape and said liner along said travel path to said platen;
- e) moving said liner around an angular front end portion of said platen to separate said liner from said tape;
- f) applying said tape to said glass by applying pressure to said tape; and

g) moving a dispenser that includes the frame, the tape spool, the platen and the rewind spool along a direction generally parallel to an edge of said glass article to define a tape pattern on said glass article.

37. The method of claim 36 further comprising winding said liner onto said rewind spool.

38. The method of claim 36 further comprising measuring a length of said tape that travels past said drive roller.

39. The method of claim 36 further comprising scoring said tape and removing a portion of said tape before said tape is applied to said glass.

40. The method of claim 36 further comprising sensing a distance between said platen and said glass and moving said platen in response to said sensed distance.

41. The method of claim 36 further comprising detecting edges of said glass with an optical sensor coupled to said frame to orient said tape with respect to said edges.

42. A tape cassette for use in a dispenser that separates a tape from a liner and applies said tape to a glass surface, comprising:

- a) a cassette frame;
- b) a tape spool rotatably mounted to said frame;
- c) a routing guide selectively connectable to said frame and removable from said frame;
- c) a platen connected to said frame having an angular front end portion that causes such liner to separate from such tape; and
- d) a rewind spool rotatably mounted to said frame, said tape spool, routing guide, platen and rewind spool defining a path of travel from said tape spool, around said

routing guide, around said front end portion of said platen, to said rewind spool.

43. The tape cassette of claim 42 wherein said routing guide comprises a plurality of pins that are selectively insertable into holes in said frame.

44. The tape cassette of claim 43 wherein a roll of tape for creating the appearance of a bevel when applied to glass having a liner is disposed on said tape spool, said tape and liner are disposed around said routing guide and only said liner is disposed around said rewind spool.

45. A method of loading tape for creating the appearance of a bevel when applied to glass into a dispenser, comprising:

a) installing a roll of tape for creating the appearance of a bevel into a cartridge having a tape spool, a routing guide, a platen and a rewind spool such that a roll of said tape and a liner are disposed on the tape spool, said tape and said liner are routed around said routing guide, said tape is separated from said liner near an edge of a platen and only said liner is routed around a rewind spool;

b) attaching said cartridge to a frame of a dispenser; and,

c) removing said routing guide from said cartridge such that said tape and said liner are disposed around a drive roller of said dispenser.

46. A tape application system for applying a tape that creates the appearance of a bevel to a surface of a glass plate, comprising:

a) a table for supporting such glass plate;

b) a gantry mounted to said table such that said gantry is movable in a first direction along said table;

c) a dispenser actuator mounted to said table such that said dispenser actuator is movable in a second direction along said gantry;

d) a tape dispenser mounted to said dispenser actuator such that movement of a

linkage of said dispenser actuator causes said tape dispenser to move in a third direction that is normal to said glass plate;

e) a pressure application wheel mounted to said dispenser for linear movement with respect to said tape dispenser, said pressure application wheel engaging said glass plate such that variations in thickness of said glass cause said pressure application wheel to move with respect to said tape dispenser;

f) a position sensor coupled to said pressure application wheel and said dispenser actuator wherein movement of said pressure application wheel is sensed by said sensor and communicated to said dispenser actuator to move said dispenser with respect to said glass plate.

47. The tape application system of claim 46 further comprising an optical sensor mounted to said dispenser for detecting edges of said glass plate.

48. A method of positioning a tape dispenser above a glass plate, comprising:

- a) positioning a tape dispenser above a glass plate;
- b) engaging said glass plate with an end portion of a position sensor that is movably attached to said tape dispenser;
- c) calculating the distance between the glass plate and the tape dispenser based on the position of the end portion of the position sensor;
- d) moving the dispenser to a desired position above the glass plate.

49. The method of claim 48 further comprising dispensing said tape onto said glass plate and adjusting said distance between said glass plate and said dispenser as said tape is dispensed.

50. A tape application system for applying a tape that creates the appearance of a bevel to a surface of a glass plate, comprising:

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- a) a table for supporting such glass plate;
 - b) a gantry mounted to said table such that said gantry is movable in a first direction along said table;
 - c) a dispenser actuator mounted to said table such that said dispenser actuator is movable in a second direction along said gantry;
 - d) a tape dispenser mounted to said dispenser actuator for dispensing a tape onto said glass plate;
 - e) an optical sensor mounted to said dispenser for sensing edges of said glass plate, said sensor being coupled to said gantry for positioning said dispenser with respect to said glass plate; and,
 - f) a controller coupled to said optical sensor, said gantry and said dispenser actuator for positioning and orienting said dispenser with respect to such glass plate.

51. A method of locating and orienting a tape dispenser with respect to a corner of a rectangular glass plate, comprising:

- a) sensing a location of a first point on a first edge of a rectangular glass plate with an optical sensor;
- b) sensing a location of a second point on said first edge of said plate with said optical sensor;
- c) sensing a location of a third point on a second edge of said plate with said optical sensor;
- d) calculating a location and orientation of a corner of said glass plate based on said sensed locations;
- e) locating and orienting a tape dispenser with respect to said corner of said glass plate.

52. The method of claim 51 further comprising determining the size of said glass plate.

53. A method of locating and orienting a tape dispenser with respect to a corner of a rectangular glass plate, comprising:

a) sensing a location of a first point on a first edge of a rectangular glass plate with an optical sensor;

b) sensing a location of a second point on said first edge of said plate with said optical sensor;

c) sensing a location of a third point on a second edge of said plate with said optical sensor;

d) sensing a location of a fourth point on a third edge of said plate with said optical sensor;

e) sensing a location of a fifth point on a fourth edge of said plate with said optical sensor;

f) calculating a location, orientation and size of said glass plate based on said sensed locations of said sensed points;

g) locating and orienting a tape dispenser with respect to said corner of said glass plate.

54. A glass processing table, comprising:

- a) a glass supporting table having first and second generally parallel sides;
- b) a first carriage coupled to said first side of said table such that said first carriage is movable along said first side;
- c) a second carriage coupled to said second side of said table such that said second carriage is movable along said second side;
- d) a support which extends over a top surface of the supporting table for movement with the first and second carriages, said support has a first end that is pivotally connected said first carriage and a second end that is connected to said second carriage such that said second end is rotatable with respect to said second carriage and said movable in a direction normal to said second side.

55. The glass processing table of claim 54 further comprising a first motor coupled to said first carriage and a second independent motor coupled to said second carriage.

56. The glass processing table of claim 55 wherein said first carriage and said second carriage are driven by independent ball screws.

57. A method of applying a decorative pattern of tape to a glass pane, comprising:

- a) scoring a tape disposed on a liner to form an end of first tape segment and an end of a second tape segment separated by a tape chad;
- b) moving said tape and said liner away from said glass pane to prevent said tape chad from contacting said glass pane;
- c) removing said chad from said liner; and,
- d) applying said tape segments to said glass pane to define said decorative pattern.